

Recommended alternative daily intake of fruits and vegetables for Indonesian elderly

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Abstrak

Latar belakang: Organisasi Kesehatan se Dunia (WHO) merekomendasikan konsumsi sayur dan buah paling sedikit 400 gr atau 5 (lima) porsi sayur dan buah sehari. Penelitian ini untuk menentukan alternatif jumlah dan jenis anjuran konsumsi sayur dan buah untuk usia 65 tahun atau lebih untuk kecukupan zat gizi vitamin A, vitamin C, potassium, asam folat, dan serat.

Metode: Penelitian menggunakan data konsumsi sayur dan buah dari data Riset Kesehatan Dasar (Riskesdas) tahun 2010. Analisis data menggunakan program analisis linier untuk memperoleh lima alternatif jumlah dan jenis sayur dan buah untuk usia lebih dari 65 tahun.

Hasil: Subjek yang dapat dianalisis sebanyak 7087 orang. Lima jenis buah yang paling banyak dikonsumsi adalah pisang, jeruk, pepaya, apel dan semangka. Lima jenis sayur yang paling banyak dikonsumsi adalah sayur bayam, sayur kangkung, sayur daun singkong, sayur asam, dan sayur sop. Berdasarkan hasil analisis progam linier dan ngka Kecukupan Gizi tahun 2004 untuk vitamin A, vitamin C, asam folat, serat, dan potasium bagi usia lebih dari 65 tahun, maka jumlah anjuran konsumsi sayur dan buah adalah 300 gram sayuran dan 200-400 gram buah.

Kesimpulan: Anjuran alternatif konsumsi sayur dan buah untuk usia lebih dari 65 tahun adalah 300 gram (3 mangkok) sayuran dan 200-400 gram (2-4 potong) buah. (*Health Science Indones 2014;1:30-4*)

Kata kunci: anjuran konsumsi harian, sayur, buah, usia lanjut

Abstract

Background: The WHO recommends the daily consumption of fruits and vegetables of at least 400 grams or 5 servings. This study was conducted to assess consumption of fruits and vegetables in 65 year-old and above Indonesians, and the adequacy of daily requirements of vitamin A, vitamin C, potassium, folic acid, and fiber.

Methods: The study used data from 2010 National Health Survey Indonesia. Using linier programming, 5 alternatives of combination of fruits and vegetables were presented for 65 year-old and above.

Result: The number of subjects that could be analyzed was 7087 subjects. The study found the five most frequently consumed fruits were bananas, oranges, papayas, apples, and watermelons. Five most frequently consumed vegetables dishes were cooked spinach, water spinach (*kangkung*), cassava leaves, tamarind vegetable dish and vegetable soup. The alternative amount of fruits and vegetables consumption for 65 year-olds and above is 300 grams of cooked vegetables and 200-400 grams of fruits.

Conclusion: Alternative fruits and cooked vegetables consumptions for 65 year-old and above Indonesians were 300 grams (3 bowls) grams of cooked vegetables and 200-300 grams (2-4 pieces) of fruits. (*Health Science Indones 2014;1:30-4*)

Key words: daily consumption guide, fruits, vegetables, elderly

Elderly people are generally more likely to have chronic diseases such as hypertension, cardiovascular diseases, and coronary heart disease. Fruits and vegetables consumption may reduce the risk of several chronic diseases, including cancers, cardiovascular diseases, coronary heart disease, hypertension and stroke.¹⁻⁵ Several studies have shown that adequate consumption of fruits and vegetables is associated with a reduced risk of cancer and coronary heart disease.^{6,7} Furthermore, previous studies have shown strong negative relationships between fruits and vegetables intake and obesity, diabetes and hypertension.^{8,9,10} Despite all these benefits, people do not properly follow the minimum recommended consumption of five servings of fruits and vegetables per day.¹¹

The factors that contribute to fruits and vegetables (FV) consumption by elderly individuals are age, gender, education, marital status, employment and economic status, chronic disease, body mass index (BMI, self efficacy, support from family and friends, knowledge regarding FV.¹²

World Health Organization (WHO) recommends consumption of vegetables and fruits at least 400 grams or 5 servings a day. Vegetables and fruits are important sources of nutrients since vegetables and fruits contain vitamins (vitamin C, vitamin B, provitamin A, folic acid, carotenoids), fiber, minerals (potassium, calcium, magnesium, selenium, iron) and phytochemicals.^{13,14}

Currently, Indonesia used WHO recommendation for the consumption of fruits and vegetables, which is flexible and adapted to local conditions because of the wide variability in diet, food availability, food preferences and cultural considerations.¹⁵

In Indonesia, analysis of Riset Kesehatan Dasar (*Riskesdas*) data of fruits and vegetables consumption per capita per day in 2005 and 2007, showed only 65% and 79% (according to 2000 kcal diet) and 59% and 72% (according to 2200 kcal diet) of the WHO recommendation. In addition, analysis of *Riskesdas* data in 2007, showed that the average consumption of fruits and vegetables per day is less than five servings per day.^{16,17}

Studies about the amount and types of alternative consumption of vegetables and fruits per day for 65 year-old and above (elderly) Indonesians have not been done. Therefore, this study aimed to assess the amount and type of fruits and vegetables consumption in 65 year-olds and above using the 2010 *Riskesdas* data.

METHODS

This study used data on fruits and vegetables consumption of the 2010 Indonesian Basic Health Research *Riskesdas* describe health problems of Indonesians and oriented to the evaluation of health indicator achievements. The *Riskesdas* study frame population was all households in 33 provinces of Indonesia. Therefore *Riskesdas* data 2010 was a community-based health data base. The sample size for the *Riskesdas* data 2010 was 70000 households from all the 33 provinces. Sample selection was random in two stages. The first stage was selection of census blocks and the second stage was selection of households.¹⁷

The selection of census blocks was done by of the Indonesian Statistics Center. There were 2800 census block and 70000 households. *Riskesdas* 2010 collected data from 2798 census block, 25 households were selected by simple random sampling. The selection of households was done by the district technical managers. There were 25 households from each census block. The 25 households were selected by simple random sampling.¹⁷

All subjects were interviewed using food consumption questionnaires. Subjects were interviewed by food consumption questionnaires food recall about what kinds and how much food were consumed in the last 24 hours.¹⁷

The subjects for this study were 65 years and older. Subjects with higher than upper limits of vitamin A, vitamin C, and folic acid were excluded from this study. The percentage of fruits and vegetables consumed by subjects was analyzed by SPSS version 17 program. A linear programming was used to assess the amount and types of alternative fruits and vegetables consumed by Indonesians aging 65 years or older. Linear programming is a tool to optimize (minimize or maximize) a linear function of a set of decision variables while respecting multiple linear constraints. The function Y to be optimized by linear programming is called the objective function.¹⁸ The types and quantities of fruits and vegetables were the function to be optimized by linear programming. Vitamin A, vitamin C, potassium, folic acid, and fiber were the set of decision variables. Linear programming was conducted five times to obtain five results for alternative fruits and vegetables consumption.

These were some steps in linear programming. The steps were: identification of purposes (optimizing what kinds and how much fruits and vegetables

were consumed by Indonesians 65 years and older), identification of decision alternatives (what kinds and how much fruits and vegetables were consumed), identification of resources that limits (vitamin A, vitamin C, potassium, folic acid, and fiber in fruits and vegetables), determining the constraint functions (adequacy of daily requirement of vitamin A, vitamin C, potassium, folic acid, and fiber), and the general model of linier programming.

RESULTS

A total of 7087 subjects participated. The five most frequently consumed fruits were bananas, oranges, papayas, apples, and watermelons. The five most frequently consumed vegetable dishes were cooked spinach, water spinach (*kangkung*), cassava leaves, tamarind vegetable dish, and vegetable soup. The percentages were: cooked spinach 13.3%, cooked

water spinach 10.6%, cooked cassava leaves 10.6%, tamarind vegetable dish 8.5, and for vegetables soup 6.3%. The percentages for the kinds of fruits and vegetables consumed for Indonesians aging 65 years or older can be seen in table 1.

Table 2 showed the alternative combinations of types of fruits and vegetables dishes consumed by Indonesians aged 65 years or was 300 grams of vegetables and 200-300 grams of fruits. There were five combinations for types of fruits and vegetables dishes consumed. The first alternative combination was cooked spinach, banana, and papaya. The second alternative combination was cooked water spinach (*kangkung*), orange, and banana. The third alternative combination was cooked cassava leaves, papaya, and banana. The fourth alternative combination was tamarind vegetable dish, watermelon, and banana. The fifth alternative combination was vegetable soup, apple, and banana.

Table 1. Percentage of kinds of fruits and vegetables consumption among Indonesians aged 65 years and older (n=7087)

Vegetables			Fruits		
Name	n	%	Name	n	%
Cooked spinach	1281	13.3	Bananas	1310	79.1
Cooked water spinach (<i>Kangkung</i>)	1027	10.6	Oranges	106	6.4
Cooked cassava leaves	1024	10.6	Papayas	79	4.8
Tamarind vegetable dish	825	8.5	Apples	42	2.5
Vegetable soup	613	6.3	Watermelons	28	1.7

Table 2. Alternative combinations of types and amount of fruits and vegetables consumed in Indonesians aged 65 years and older

Alternative	Type	Weight (g)	Portion	% RDA*				
				% Vit A	% Vit C	% Fiber	% Potassium	% Folic acid
1	Spinach	300	3	180.1	117	29	42.3	73.8
	Banana	100	1					
	Papaya	150	3					
2	Water spinach	300	3	82	120.5	34	34.2	52.9
	Orange	100	1					
	Banana	150	3					
3	Cassava leaves	300	3	115.9	126.5	21	47.9	55.6
	Papaya	100	1					
	Banana	150	3					
4	Tamarind vegetable dish	300	3	36.1	62.5	28.7	34.3	26.4
	Watermelon	100	1					
	Banana	150	3					
5	Vegetable Soup	300	3	179.5	28.5	54	38.5	31.9
	Apple	100	1					
	Banana	150	3					

*Recommended Dietary Allowance Indonesia in 2004

DISCUSSION

The results showed the alternative type and amount of fruits and vegetables consumption for 65 years and older was 3 servings of vegetables and 2-4 servings of fruits. A serving of vegetables weighs approximately 100 grams and one serving of fruits weighs approximately 100 grams. The types of vegetable dishes and fruits as alternatives were vegetable dishes and fruits commonly and widely consumed by the population of Indonesia. Suggested vegetable dishes were cooked spinach, vegetable soup, cooked water spinach (*kangkung*), cassava leaves, and tamarind vegetable dish, while alternative types of fruits were bananas, oranges, papayas, apples, and watermelons.

These alternative vegetable dishes and fruits met 80% of the required nutrients for vitamin A, vitamin C, fiber, potassium, and folic acid, and the other 20% nutrients can be derived from other food sources.

Currently, some countries have guidelines for daily fruits and vegetables consumption according to the conditions of each country. Greece, the Netherlands, England, New Zealand, USA, Switzerland, Australia, Japan, Spain, Canada, Mexico, Argentina, Brazil, Malaysia, Philippines, South Africa and Mauritius are examples of countries with specific guidelines.¹⁹

Many countries have adopted the recommendation to eat at least 400 grams fruits and vegetables a day. Experts and organizations incorporate the recommendations in the guidelines for their diet. Some dietary guidelines only contain qualitative messages, such as "Increase consumption of vegetables and fruits", "Eat a variety of vegetables and fruits every day" or "Eat a lot of vegetables and fruits". Those have been applied in Chile, China, Finland, France, Ireland, Norway, Portugal, and Sweden. Guidelines of diet in some countries such as Denmark, Germany, or Indonesia give recommendations as portion quantitative terms without definition of what is meant by a portion.¹⁹

Data on fruits and vegetables intake derived from food balance sheets in 21 countries (mainly developing countries) showed that only in three of those countries did fruits and vegetables intake meet the minimum World Health Organization (WHO) recommended consumption.²⁰ Less than half the elderly subjects were eating five portions of fruits and vegetables a day. Low fruits and vegetables consumption was particularly associated with being male, smoking and having low levels of social engagement.²¹ The result of fruits and vegetables

consumption among elderly Iranian study showed it was low and varied greatly with age, education and income level. In addition, the results indicated that low perceived benefits, low self efficacy and perceived barriers could lead to lower consumption of fruits and vegetables.¹²

In conclusion, alternative fruits and vegetables consumption for Indonesians aged 65 years and older were 300 grams (3 bowls) grams of vegetables and 200-300 grams (2-4 pieces) of fruits. There were five alternative combination of fruits and vegetables. The dissemination of information about the alternative fruits and vegetables consumption should be done for the elderly to increase fruits and vegetables consumption

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